UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/682,364	10/10/2003	Edythe Patricia LeFeuvre	13567-002	7812

1059 7590 03/06/2008

BERESKIN AND PARR
40 KING STREET WEST
BOX 401
TORONTO, ON M5H 3Y2
CANADA

EXAMINER	
PATEL, JAYESH A	

ART UNIT	PAPER NUMBER
2624	

MAIL DATE	DELIVERY MODE
03/06/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	**Application No.** 10/682,364	**Applicant(s)** LEFEUVRE ET AL.	
	Examiner JAYESH A. PATEL	**Art Unit** 2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 December 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *10 October 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. This office action is in response to the reply 08/31/2007. The finality of the action has been withdrawn.

2. The detailed rejections to the claims is presented below.

3. The examiner likes to point out that “Top- hat transformation” is a morphological filter well known in the art and as seen in the reference (US 5365429). Reference 5365429 discloses that "a morphological filter known as a “top-hat” transformation was applied to the original image to attempt to extract the boundaries of the spots” at **(Col 2 Lines 11-15)**. (US 6728401) Hardeburg is disclosing morphological filtering operation to identify the red-eye artifact as seen in Fig 6 and at **(Col 7 Lines 62-65)** where the morphological is referring to the “top-hat" transformed image. The smoothing helps in better detection of the red-eye artifacts.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 17-20 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. Claims 17-20 are drawn to functional descriptive material NOT claimed as residing on a computer readable medium. MPEP 2106.IV.B.1(a) (Functional Descriptive Material) states:

> "Data structures not claimed as embodied in a computer-readable medium are descriptive material per se and are not statutory because they are not capable of causing functional change in the computer."
>
> "Such claimed data structures do not define any structural or functional interrelationships between the data structure and other claimed aspects of the invention which permit the data structure's functionality to be realized."

Claims 17-20, while defining a computer program product, does not define a "recording medium" and is thus non-statutory for that reasons. A recording medium can range from paper on which the program is written, to a program simply contemplated and memorized by a person.

> "In contrast, a claimed computer-readable medium encoded with the data structure defines structural and functional interrelationships between the data structure and the computer software and hardware components which permit the data structure's functionality to be realized, and is thus statutory." - MPEP 2106.IV.B.1(a)

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-3,6-10, 13-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hardeberg (US 6728401) in view of Susanta Mukhopadhyay **("A multiscale morphological approach to local contrast enhancement" Signal processing 80 (2000) 685-696)** hereafter Susanta.

4. Regarding Claim 1, Hardeberg discloses a method of correcting a red-eye effect in a digital image provided by a cluster of pixels **(Fig 6)**, the method comprising; (b) conducting an intensity threshold operation on the tophat image **(an image)** to provide a segmentation mask (mask containing red eye artifact pixels) for segmenting objects in the digital image at **(Col 4 Lines 7-17 where the mask is generated from the original image using the threshold operation to identify the red eye artifact pixels. The original color image is thresholded against the reference color to generate a image with artifacts)**. The yielding of mask containing one or more circular blobs **(segmented mask)** is the result of the intensity threshold operation; (c) for each segmented object in the segmentation mask, extracting at least one feature from at least one of the segmented object **(circular-shaped blobs as the pupil of the eye through which the light reflected by eye's retina is circular)** and a border region surrounding the segmented object **(areas surrounding the pupil which are falsely identified as the reddish areas by the mask generation unit)** and classifying the segmented object based on the at least one feature **(red color characteristics)** at **(Col 4 Lines 22-39)**; and (d) for each segmented object in the segmentation mask classified as red-eye effect in step (c), correcting the red-eye effect by re-coloring **(one or more of the color characteristics are modified to correct at Col 4 Lines 37-39)** the segmented object to generate a corrected image at **(Col 4 Lines 39-50 where the masked portion is contrast stretched to generate a dynamic image)**. Hardeberg is silent and however does not disclose (a) conducting at least one tophat operation over each pixel in the digital image to provide a tophat image.

Susanta discloses (a) conducting at least one tophat operation over each pixel in the digital image to provide a tophat image at **(Page 689 section 3.1 where the top-hat transformation extracts the bright objects from images)**. Susanta further discloses that the multiscale top-hat transformation extracts scale specific bright features and achieves local contrast stretching as in section 3.1. Susanta and Hardeburg are analogous art, therefore it would have been obvious for one of ordinary skill in the art at the time the invention was made to have used the teachings of multiscale top-hat transformations in the method and apparatus of Hardeberg for the above reasons.

5. Regarding Claim 2, Hardeberg and Susanta discloses the method as defined in claim 1. Susantha further disclose wherein the tophat image is a dark tophat image **(black tophat image in section 3.1 page 689 Line 15)**, and the tophat operation comprises the steps of: conducting at least one greyscale dilation operation over each pixel in the digital image to provide a dilated image at **(Page 688 Section 3 where the morphological opening and closing are disclosed.)**; conducting at least one greyscale erosion operation over each pixel in the dilated image to provide an eroded image **(Page 688 Section 3 where the morphological opening and closing are disclosed.)** ; and, subtracting the digital image from the eroded image to provide the dark tophat image at **(Page**

689 section 3.1 Line 15 where the black tophat image is achieved after subtracting the closed image from the original image). While susantha discloses the grayscale erosion and dilation **(or opening (erosion followed by dilation) and closing (dilation followed by erosion))**. Hardeberg discloses the erosion and dilation **(or opening (erosion followed by dilation) and closing (dilation followed by erosion)** on binary images.

6. Regarding Claim 3, Hardeberg and Susantha discloses the method as defined in claim 1. Susantha further disclose wherein the tophat image is a bright tophat **(white tophat image in section 3.1 page 689 Line 16)**image, and the tophat operation comprises the steps of: conducting at least one greyscale erosion operation over each pixel in the digital image to provide an eroded image at **(Page 688 Section 3 where the morphological opening and closing are disclosed.)**; conducting at least one greyscale dilation operation over each pixel in the eroded image to provide a dilated image at **(Page 688 Section 3 where the morphological opening and closing are disclosed.)**; and, subtracting the dilated image from the digital image to provide the bright tophat image at **(Page 689 Section 3.1 where the bright (white) top hat image is achieved after subtracting the opened image from the original image)**. While susantha discloses the grayscale erosion and dilation **(or opening (erosion followed by dilation) and closing (dilation followed by erosion))**. Hardeberg discloses the erosion and dilation **(or opening (erosion followed by dilation) and closing (dilation followed by erosion)** on binary images.

7. Claim 8 is a corresponding system claim of a method of Claim 1. See the explanation of Claim 1 and also see **(Fig 1 in hardeberg)**. Hardeberg discloses the system at **(Col 3 Lines 45-51)**.

8. Claim 9 is a corresponding system claim of a method of Claim 2. See the explanation of Claim 2 and also see **(Fig 1 in Hardeberg)**. Hardeberg discloses the system at (**Col 3 Lines 45-51)**.

9. Claim 10 is a corresponding system claim of a method of Claim 3. See the explanation of Claim 3 and also see **(Fig 1 in Hardeberg)**. Hardeberg discloses the system at (**Col 3 Lines 45-51)**.

10. Claim 17 is a corresponding Computer program product of the method of Claim 1. See the explanation of Claim 1 and also **(Fig 1, Col 3 Lines 45-51)**.

11. Claim 18 is a corresponding Computer program product of the method of Claim 2. See the explanation of Claim 2 and also **(Fig 1, Col 3 Lines 45-51)**.

12. Claim 19 is a corresponding Computer program product of the method of Claim 3. See the explanation of Claim 3 and also **(Fig 1, Col 3 Lines 45-51)**.

13. Regarding Claim 6, Hardeberg and Susanta discloses the method as defined in claim 1. Hardeberg further disclose wherein step (c) comprises, for each segmented object in the segmentation mask, after extracting the at least one feature **(Col 7 Lines 32-41)**, comparing the at least one feature with a paradigmatic red-eye feature cluster (example of reference red color pixels at Col 4 Lines 9,18-22) to determine an associated probability that the segmented object is a red-eye defect **(Col 7 Lines 42-51)**, and classifying the segmented object as a red-eye defect if and only if the associated probability exceeds a threshold probability at **(Col 7 Lines 52-67 and Col 8 Lines 1-9)**. Hardeberg also discloses that a conservative threshold is selected to correctly identify the red-eye defects and exclude the pinkish and reddish regions near the corner of the eye.

14. Regarding Claim 7, Hardeberg and Susanta discloses the method as defined in claim 1. Hardeberg disclose further comprising selecting the digital image from an initial image at **(Fig 2 Element 220)**. Hardeberg defines a ROI from the image to decrease the processing time as seen in **(Col 3 Lines 63-67)**.

15. Claim 13 is a corresponding system claim of a method of Claim 6. See the explanation of Claim 6 and also see **(Fig 1)**. Hardeberg discloses the system at **(Col 3 Lines 45-51)**. Hardeberg also discloses that algorithms can be written to select the threshold manually or automatically at **(Col 7 Lines 8-11)**.

16. Regarding Claim 14, Hardeberg and Susanta discloses the system as defined in claim 8. Hardeberg disclose further comprising a display for displaying initial image; and a user-operable selection means for selecting the digital image from the large image in **(Fig 1 and 2)**. The selection of ROI is selecting a region from a larger image.

17. Regarding Claim 15, Hardeberg and Susanta disclose the system as in claim 8.. hardeberg further disclose the system in **(fig 1 and at Col 3 Lines 45-51)** . Hardeberg also discloses that algorithms can be written to select the threshold manually or automatically at **(Col 7 Lines 8-11)** which would provide with the means for user selecting the threshold.

18. Claim 16 is a corresponding system claim of a method of Claim 1. See the explanation of Claim 1 and also see **(Fig 1 in Hardeberg)**. Hardeberg discloses the system at **(Col 3 Lines 45-51)**. Hardeberg also discloses the user selectable input section 170 and elements 140 and 145 for the detection and correction of the redeye defect.

Claims 4-5,11-12 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hardeberg in view of Susanta and in further view of Luck et al.(US 5257182) hereafter Luck.

19. Regarding Claim 4,Hardeberg and Susanta discloses, a method as defined in claim 1. Hardeberg discloses (b) conducting an intensity threshold operation on the at least one low resolution tophat image **(an image)** to provide a segmentation mask (mask containing red eye artifact pixels) for segmenting objects in the digital image at **(Col 4 Lines 7-17 where the mask is generated from the original image using the threshold operation to identify the red eye artifact pixels. The original color image is thresholded against the reference color to generate a image with artifacts)**. The yielding of mask containing one or more circular blobs **(segmented mask)** is the result of the intensity threshold operation; (c) for each segmented object in the at least one low resolution segmentation mask, extracting at least one feature from at least one of the segmented object **(circular-shaped blobs as the pupil of the eye through which the light reflected by eye's retina is circular)** and a border region surrounding the segmented object **(areas surrounding the pupil which are falsely identified as the reddish areas by the mask generation unit)** and classifying the segmented object based on the at least one feature **(red color characteristics)** at **(Col 4 Lines 22-39)**; and (d) for each segmented object in the at least one low resolution segmentation mask classified as red-eye effect in step (c), correcting the red-eye effect by re-coloring the segmented object to generate a corrected image at **(Col 4 Lines 39-50 where the masked portion is contrast stretched to generate a dynamic image)**. Hardeberg is silent and however does not disclose generating at least one low resolution image from a digital image and conducting a secondary tophat operation over each pixel in the low resolution image to provide atleast one low resolution top-hat image.

Susanta discloses conducting a secondary tophat operation over an image **(on page 689 Section 3.1 Col 2 "an ordered sequence of morphological tophat filtering through opening and closing of the image extracts scale specific features shows the tophat operation performed several times and as such a secondary tophat operation is performed)**, however is silent and does not disclose the image being a low resolution image.

Luck discloses a system and method of morphological classification in which a low resolution image is generated **(Fig 1 element 30 and Col 7 Lines 23)**, performing a tophat operation on the low resolution image to generate low resolution top-hat image at **(Col 8 Lines 46, as recited in claim 13 and as seen in Figs 5A-5C)**. Luck discloses that the system and method as disclosed is highly accurate and automated at **(Col 1 Line 67)** produces or classifies a low resolution image **(applies morpholgical filter like top hat) and generates a image after filtering (which is a high resolution image and contains the objects of interest that are displayed)** at **(Col 2 Lines 8-25)**. Luck discloses the first filtering **(top hat operation as in claim 13)** on the first digital representation **(low resolution scan)** at **(Col 2 Lines 30-32 which shows the tophat performed on low resolution image)**. Luck, Hardeberg and Susanta are analogous art , therefore it would have been obvious for one of ordinary skill in the art at the time the invention was made to have used the teachings of Luck in the system and method of Hardeberg and Susanta for the above reasons. Luck, Hardeberg and Susanta all disclose performing morphological filtering on images.

20. Claim 11 is a corresponding system Claim of the method of Claim 4. See the explanation of Claim 4.

21. Regarding Claim 5, Hardeberg and Susanta discloses the method as defined in claim 3. Susanta discloses generating a bright top-hat image at **(Page 689)**, however Hardeberg and Susanta are silent and do not disclose wherein step (b) comprises, after intensity thresholding the bright tophat image, filtering out objects having compactness below a threshold level of compactness to provide the segmentation mask. Luck discloses **(Fig 5B step 195 which produces bright tophat image, threshold at element 200 and generating a mask at 210)**. The threshold value is further explained in **(Col 11 Lines 2-3)**.

22. Claim 12 is a corresponding system claim of a method of Claim 5. See the explanation of Claim 5.

23. Claim 20 is a corresponding Computer program product of the method of Claim 5. See the explanation of Claim 5.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JAYESH A. PATEL whose telephone number is (571)270-1227. The examiner can normally be reached on M-F 7.00am to 4.30 pm (5-4-9). If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jingge Wu can be reached on 571-272-7429. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service

Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jayesh A Patel/
Examiner, Art Unit 2624

/Jingge Wu/
Supervisory Patent Examiner, Art Unit 2624